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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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WOULD YOU TRUST HER?

Not *a "Pretty Girl" Cover*

(*See page* 50)

Vol. XIV *No. 381*

Reading Character May Soon Be Possible

Psychology

By DONALD A. LAIRD

Dr. Laird is director of the Psychological Laboratory, Colgate University.

Recent scientific studies indicate that there may be a way to read character from physique. But that way is not phrenology, and the difference between pseudo-scientific cults and scientific facts should be clearly understood.

During the Franco-Prussian War, a little more than a half-century ago, a young army surgeon was operating on a soldier with a skull wound which exposed the surface of the brain. Dr. G. Fritsch, the surgeon, experimentally applied a weak electric current to the brain surface and noted that this caused a twitching of some of the patient's muscles.

A short time later, Dr. Fritsch talked this remarkable observation over with a fellow scientific worker and together they performed experiments upon dogs. These experiments of Dr. Fritsch and E. Hitzig are scientific classics.

They were the first to discover that the left side of the brain has centers for controlling movements of muscles on the right side of the body. When the brain was stimulated near the top of the skull cavity, movements of the foot and leg were observed. As the mild shocks were gradually moved toward the bottom of the brain, muscles of the trunk and fingers and arms were caused to twitch. Near the very bottom of the brain surface, twitches of the face muscles were produced.

This is commonplace information to many people now, but it took courage in 1870 to announce such observations, because the scientific world at that time was firmly set against any idea of mental functions being located at any definite place. No doubt, Fritsch and Hitzig were called phrenologists and even worse by their scientific confreres, but they stuck by their guns and laid the basis for modern brain surgery. Unfortunately their work was seized upon by a few fanatically inclined persons and used in an attempt by them to revive the old idea of phrenology. But in this attempt to bring phrenology back to life the two scientists had no direct part and to it they lent no encouragement.

The world of science in their day was reluctant to believe that stimulating the brain at any place would bring about definite muscular contractions because they had been disgusted with the teachings of Franz Gall, the father of phrenology. Gall had tried to start a science of reading character by studying the shape of the head and facial features. He became too enthusiastic, however, and led a group of his camp followers with such zeal that soon the French state called a halt to his activities, being fearful lest they would undermine religion. This was a rough half-century before Fritsch's observations during the surgery of the battlefield.

Gall started out as a careful scientist, but soon became oversold on his fundamental ideas and disregarded ordinary scientific precautions. He became an applied scientist too soon. He overlooked instances which contradicted his ideas, drew conclusions from an insufficient number of cases, and finally the practical urge led him on to the disastrous method of reasoning by analogy.

Many ludicrous inferences arose from his reasoning. A person with hair after the fashion of Lloyd George suggested remotely the appearance of the male lion and was assumed to have lionesque traits. Of course, anyone who wants to can have his hair trimmed in this manner.

Persons with prominent foreheads were given credit for intellectual brilliance, when we know that usually prominent foreheads are causd by rickets in childhood. Others with small eyes were given credit for serpentine qualities. Is it any wonder that scientific workers in the middle of the last cen- *(Turn to next page)*

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Reading Character May Soon Be Possible—Continued

FROM LEFT TO RIGHT: ROBERT, JAMES, FRANK, RICHARD, EDWARD AND ORVILLE. Pretend that you are a physiognomist and try to decide which one of each of these three pairs of men is the more intelligent. The scientific findings are given *on page 50*

tury were suspicious of anything which smacked of phrenology in any way?

The work of Fritsch and Hitzig made phrenology appear still more ridiculous. At about the top and center of the skull, for instance, phrenologists had said that love for parents was located, but Fritsch and Hitzig found that the brain center at this location controlled the movements of the foot.

Still, nothing seemed to stop the progress of phrenology until it just naturally spent itself. Every critical study made of it revealed that in no detail could phrenological teachings be accepted as true. Yet it grew and schools were established and phrenological museums started.

Even now phrenology has not spent itself as a cult. Of course, you have seen the small tents at the carnival, fair, or circus with a painting of a large head divided into zones like a parcel-post chart hanging outside. Very few people take this side of phrenology seriously; it is entertainment pure and simple—unusually simple.

There is a school and museum of phrenology in the roaring forties in New York City. In a small midwestern village there is a correspondence school of phrenology. For forty dollars cash (add ten if by installments) you can take thirty lessons by mail, which will earn you the degree of M. P. S., which to the initiated means Master of Phrenological Science. If you raise the ante and take a few more lessons you can become a D. P. S.—Doctor of Phrenological Science. A recent United States senator who was on important educational committees held an "advanced degree" from this school and read their magazine each month. A school superintendent in one of the largest Texas cities recently completed the course with "Books and calipers furnished free as needed, which you keep. Also a fine diploma when done."

It is out of consideration entirely as a science, but not as a cult.

Phrenology some time ago tried to reform itself as physiognomy, by considering all physical features such as texture of hair and skin, shape of fingers, and general build, as well as merely the relations between different parts of the skull which phrenology had considered solely.

The person with a bronzed skin, fairly muscular, and with large bones as shown by big hands and feet probably takes on this appearance because of the activity of his pituitary gland. If such is the case, a person with this appearance in most instances will be difficult to fatigue and possibly have high ideals. Further than this we cannot go in bringing modern scientific knowledge to interpret this character, and it may be that we are not justified in going even this far.

But physiognomists have a whole catalogue of character readings for such a person which include the type he should marry, the occupation he should follow, and where his investments will be the most successful. You can buy magazines on the newsstands which contain advertisements of those who will read your character if you send them a photograph; these simply show that Barnum was right, and not reading character from physique.

How to read character from handwriting is the subject of a book which had a tremendous sale not so long ago. It appeals to the imagination to be able to double-cross your friends and read their character from the notes they write. I do not worry about really giving away any inner secrets myself by the way I write, for I am familiar with careful studies made of claims of graphologists which have revealed their complete inability to tell even the sex of the person writing.

It does seem reasonable to suppose that the person who writes with a firm hand—or perhaps it is a blunt pen!—has determination, or that the person who crosses his "t's" a quarter of an inch too late is slovenly, but we must remember that this is reasoning by analogy and does not give trustworthy evidence about the character of the writer. It does indicate, however, gullibility on the part of the person who believes in it.

To the scientist, phrenology, physiognomy, graphology, and the other ologies dealing with character reading are of little concern, except as widespread superstitions. I think these are vicious superstitions, though, since they are blocking the road for real progress of scientific discovery in the field.

There are a few modern Fritschs and Hitzigs, who are courageous enough to brave being called "reincarnated phrenologists", who are doing research of the first water in the quest of something which may make possible a truly scientific character reading. Here and there they have opened a way through which we see the glimmer of light which encourages many of us who are hopeful that perhaps we may be on the verge of a real science in this field.

Of three things are we certain: No alleged method of character reading is trustworthy in the least degree. There are positive indications that we may shortly have real insight into character reading. When we do have this insight it will not be as simple as fraudulent books and articles on it make believe.

Fraudulent, but interesting, schemes for reading character will always have in their favor that they are so exceedingly simple that anyone can use them after a few hours' reading. The correspondence course in phrenology to which I referred, for instance, after thirty lessons-by-mail, prepares the student "to *(Turn to next page)*

Reading Character May Soon Be Possible—*Continued*

give lectures and charts, begin the practice of the profession, and make money."

It is from studies of people with mental breakdowns that the newer scientific knowledge about how appearance may present clues to deeper mental makeup is developing. There is little strange or new about the actions and thoughts of people with disordered minds—although the average person suspects something very different. In practically all instances a disordered mind is like any normal mind that is exaggerated in some respects. It is important to appreciate this fact to understand how we may be able to learn about the character of you or me from the wards of a state hospital.

We all have moods; some days we are right with the world and everything is going swimmingly, but other days things seem blue and we find it difficult to keep the pep and enthusiasm and cheerfulness of yesterday. If you can imagine this change in moods exaggerated perhaps a thousand times, you will know how the patient with manic-depressive mental disorder feels and acts.

A short time ago I met a famous American sculptor whose works are perhaps pictured on the walls of your public library or schools. I met him in the ward of a mental hospital. He was sitting on a chair, a picture of profound melancholy with his frame bowed and his hands clasped desperately between his knees, while tears trickled down the cheeks of his mournfully lined face. It was an unexplainable spell of the blues, but much more deep than those you or I usually experience.

The following day I saw him again, but he had changed so that he was scarcely recognizable. His face beamed happiness. He was so peppy that the hospital physicians were afraid he might break the chair when he sat down with a great, happy thump. He talked incessantly and hilariously. If his wife had seen him then I am afraid she would have suspected that he had been drinking and had a happy jag.

1 Colgate University
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WHICH OF THESE LINES were written by women? The answer is on page 50

It has been discovered that the manic-depressive patient, such as this well-known sculptor was for a while, has a type of body build different from that of most other mental patients, and different from that of the average man. Some "average men" have a body form which approximates closely that of the manic-depressive person, and it has been discovered that in most instances these have a mental make-up which is similar to that of the manic-depressive, but the changes are not so marked.

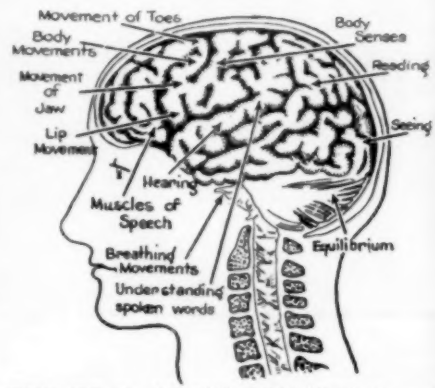
These people are energetic, emotional. Baldness and grey hair is common among them.

The type of build reveals a relatively large trunk volume in proportion to limbs. They are "well fed" people, although not necessarily fat—they may have just a long trunk and short legs rather than a pouchy fat trunk. They are called of macrosplanchnic build, although somewhat synonymous terms for this constitution are: brachymorphic, megalosplanchnic, pyknic, cyclothymic, or brachyskelic. The wide variety of terms for this build reflects the unsettled state of research in the field.

A simple measure which approximates accuracy for this build is to divide one's height in inches by his weight. If the height-weight index this yields is below .42 a man is probably of macrosplanchnic build, and probably has the complex traits found in the majority of macrosplanchnics. If the height-weight index of a woman is below .45, she is probably macrosplanchnic. Women are more macrosplanchnic than men, and everybody is macrosplanchnic in youth.

Dr. George Draper of New York City has found that this type of constitution is closely associated with gall bladder disturbances. This does not mean, of course, that all macrosplanchnics are doomed to gall stones and manic-depressions — it simply means that very seldom are gall stones found except in this type.

Dr. Elida Evans has recently reported that cancer is rarely found except in this build, and her observations have been confirmed in essence by Dr. J. H. Cassity, formerly of Saint Elizabeth's Hospital in Washington—yet one of my friends who is distinctly not of this build was recently operated upon for cancer. Exceptions are always to be expected in a field in which definite knowledge is still being laboriously accumulated.



THE REAL BRAIN CENTERS do not correspond with the phrenologist's "bumps" at all

Let me introduce you to another interesting mental and constitutional make-up. Do you know a child who would rather read a book than play vigorously and emotionally with other children—especially if it is a book of imaginative stories? Or perhaps you know some grown-ups who like to be by themselves, who are hard to get acquainted with, and who are bookishly impractical? They are "drawn into a shell."

If they draw more into their shells, talk scarcely at all, and live in their imaginations, soon they begin to believe what they imagine and hear people saying bad things about them where there is no person within earshot, or think they have great property, as the imaginative child imagines some paper clippings in a cigar box are treasures, then we have a mental disorder known as schizophrenia.

Some time ago I visited a distinguished minister who was a patient for a while in a hospital when he was acting abnormally, due to schizophrenia. He was so completely engrossed in his imaginings that he apparently did not see me. He would smile from time to time as some pleasant mental picture was formed, and would move uncomfortably at times when the mental pictures were not pleasant. Once he turned and talked to two people at his left, although he and I were alone in the room and I was on his right. Imagination gone riot!

(Turn to page 49.)

Color Test for Vitamin

Physiological Chemistry

The color test for vitamin A in cod liver oil has now been proved thoroughly reliable when compared with the old biological method of testing for presence of this vitamin, according to experiments carried on at laboratories in the University of Sheffield, University College, London, Kings' College for Women, London, The Lister Institute and the University of Oslo.

At these laboratories several different samples of the oil were tested by the biological method, which is a feeding method carried out on experimental animals, and the same oils were tested by the color test by Dr. Otto Rosenheim, of the National Institute for Medical Research, who originally devised the color test. The results were so similar that the reliability of the color test was proved without any doubt.

However, the two methods are now to be compared for other substances containing vitamin A, such as butter.

Science News-Letter, July 28, 1928

X-ray Pictures of Brain

Anatomy

A method of investigating the brain by means of X-ray photographs has been perfected by Dr. Max Ludin, director of the Roentgen Institute of the Citizens' Hospital, Basel, Switzerland. Making use of the contrast method generally used in X-ray diagnoses of other conditions, Dr. Ludin has been able to locate exactly tumors in the brain, thus making removal of the tumor by operation much easier.

Air is pumped into the cavities of the brain where it shows as white patches in the X-ray pictures. If one of the cavities contains a tumor, the air cannot penetrate into the cavity and so the white patch does not show.

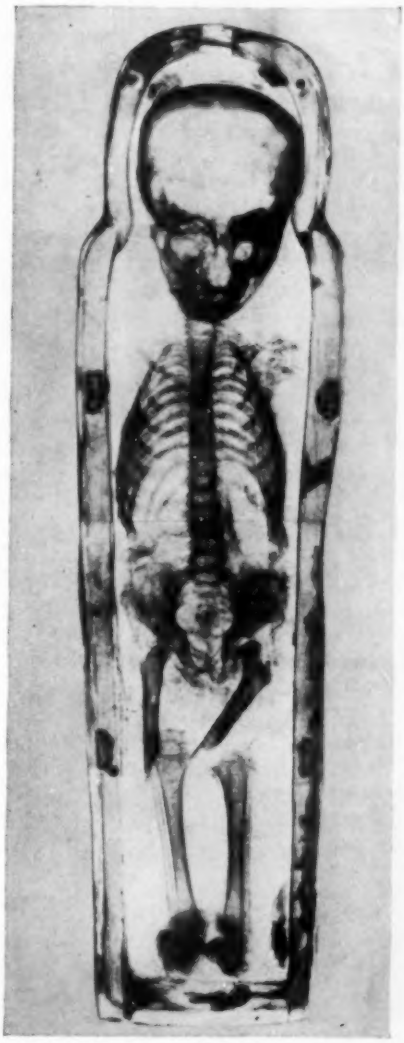
In making X-ray pictures of the medulla, which is the part between the spinal cord and the brain, a specially prepared oil is used instead of air. This oil is heavier than the spinal fluid which fills the medullary canal, so it flows down, appearing in the picture as a black strip. If there is a tumor in the canal, the strip stops at the upper edge of the tumor.

Dr. Ludin is now working with an oil lighter than spinal fluid, by which he hopes to find the lower edge of the tumor, thus locating it exactly for operation.

Science News-Letter, July 28, 1928

X-Rayed Mummies Show Broken Bones

Archæology—Pathology



X-RAY PHOTOGRAPH of mummified child, showing how leg bones were broken to make the body fit the mummy case

The theory that ancient Egyptians were intensely sincere worshipers of their dead is challenged by X-ray studies of mummies now being carried on at the Chicago Field Museum by Miss Anna R. Bolan, staff roentgenologist.

Specimens thus far studied reveal that, while the outside wrappings were always elaborate, the bodies inside were not always so carefully treated. One mummy case contained only a skull and legs with a few finger bones carelessly thrown in. Another picture, reproduced herewith, was that of a small child, and showed that both arms had been severed and the upper bones of both legs broken to make the body fit into the case. A long animal bone was discovered inside the body of a female mummy, indicating that embalmers were sometimes careless in their work.

Pathological studies were made by Dr. Cora A. Matthews of the staff of Cook County Hospital, a noted diagnostician. In the X-ray pictures of three mummies of Egyptian children she found traces of diseases common among children of today. The X-ray pictures show two of these mummified children had a distinct scoliosis or curvature of the spine, Dr. Matthews reports, a condition due to incorrect sitting posture. This is often found among school children today, and teachers and public school health authorities are continually at work to prevent its spread.

The other mummified child, a small baby, was a victim of malnutrition, Dr. Matthews says, as the X-ray pictures show transverse lines of irregular calcium development in the bones, the condition which is caused by improper and inadequate feeding among many children of poor families today.

Photos were made with the X-ray apparatus recently presented to the museum by its president, Stanley Field. The introduction of the X-ray is a new departure in museum practice, and the Field Museum is the first institution of its kind in the world to adopt it. It is believed still to be the only museum so equipped. The apparatus is used not only on mummies, but makes it possible to inspect the inside of many kinds of anthropological, botanical, geological and zoological specimens, and establish many scientific facts without damage to the specimens.

The X-ray pictures of mummies will remain as a permanent exhibit in Egyptian Hall, along with the mummies which they represent. There are a number of others, besides those of the three children, on display. A noted palæopathologist, Dr. Roy L. Moodie, formerly of the University of Illinois, is making further pathological studies of others by the X-ray photographs.

Science News-Letter, July 28, 1928

There are more Canadians in prison for serious crimes in the United States than in Canada.

Ancient desert caravans of Mediterranean countries are rapidly being replaced by trans-desert automobile services.

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Among men who achieved fame in spite of a struggle with tuberculosis are named Paganini, Chopin, Schiller, Eugene O'Neil, Thoreau, and Dostoievsky.

The sun produces tides, but because of its great distance from the earth its effect on the tides is much less than that of the moon.

The suggestion that condemned convicts in Cuba should be used in cancer experiments instead of executed is being debated with much interest in that country.

A pair of beaver and a pair of Rocky Mountain sheep were recently shipped from Canada to New Zealand for exhibition at the zoo at Auckland.

Understand the Eye

Optics

GENEVIEVE TAGGARD, in the *New York Herald Tribune*:

Opposite the infinite
Is the single eye set.

In its care the infinite lies,
A mighty jewel claspt to finite size.

There, there in indivisible
Purity the old lights dwell,

Poured by the aged light of some
Star on the eye-ball's convex room.

Opposite the infinite
Is the single eye set,

There to behold curved space that goes
Opening the lavish starry rows,

There by a slowly gathered gaze
Weaving star-rays on star-rays;

Or single, pierced, nugget of clear sight,
Shut on its eye-hinges for night.

O opposite the infinite
Is the single eye set.

The depth, the tunnel of sky
Held to the lance of the eye

Blunts the beam, the lines outspread
From the eye's head.

Curve to curve, with no end
The thick beams bend,

And the cave of far space
Tips to the cave of the face.

This is the great dignity—
The repose, of the eye.

Science News-Letter, July 28, 1928

Observation and Theory

General Science

WILLIAM HERSCHEL, *On the Construction of the Heavens,* read before the Royal Society February 3, 1785:

If we would hope to make any progress in an investigation . . . we ought to avoid two opposite extremes, of which I can hardly say which is the most dangerous. If we indulge a fanciful imagination and build worlds of our own, we must not wonder at our going wide from the path of truth and nature; but these will vanish like the Cartesian vortices, that soon gave way when better theories were offered. On the other hand, if we add observation to observation, without attempting to draw not only certain conclusions, but also conjectural views from them, we offend against the very end for which only observations ought to be made. I will endeavor to keep a proper medium; but if I should deviate from that, I could wish not to fall into the latter error.

Science News-Letter, July 28, 1928

Reading Character— *Cont'd*

The same researchers have discovered that in most schizophrenia patients there is also a distinctive body build. This is usually the exact opposite of the macrosplanchnic.

Long limbs with a relatively small trunk volume is their characteristic. They are long-legged, thin people in general, although a fat person may have such long legs and arms that they throw him into this group. They are more intelligent as a rule than macrosplanchnics, and are more easily fatigued and more sensitive to pain.

This is the microsplanchnic build, although it sports many names which means much the same constitution, such as, dolichomorphic, asthenic, schizoid, hypovegetative, hypoplastic, and dolichoskelic.

It is more characteristic of men than of women. A man with a height-weight index above 0.53 is microsplanchnic, while a woman with an index above 0.58 has this constitution in most cases.

Dr. Draper has found that this is the gastric ulcer type, most patients with this ailment coming from this constitutional make-up. They are also especially prone to tuberculosis, as well as having their distinctive mental make-up in most cases.

The tape measure and bathroom scales are a fair index of type of build, but are not completely trustworthy. A series of twelve measurements made with delicate instruments is essential to get an accurate morphological index, but the height-weight index approximates this closely in many cases.

From childhood to old age we all pass through a transition in these constitutional features. In emotionally pleasurable and energetic childhood we were more macrosplanchnic than we are at maturity, and as old age draws over us we become more inclined toward the microsplanchnic and live more in the realm of fancy as well as having more trouble with what we should eat.

As we deviate somewhat from the average between these extreme types in build so are we likely to have somewhat distinctive mental traits, without being in any sense abnormal in either build or mental makeup.

Work which has been under way for three years in the Colgate Psychological Laboratory, under the successive leadership of Robert C. Little, Philip Payne, and now J. C. Anderson, indicates definitely that the college man who *(Turn to next page)*

South Africa Dreads Corn Borer

Entomology

The European corn borer, which has become a scourge in America, is being guarded against in the Union of South Africa with all the vigilance that would be used to stop the coming of the Black Plague or an invading army. It has not yet succeeded in gaining a foothold in South Africa, and government scientists do not propose that it shall do so.

One bad scare occurred in Johannesburg something over a year ago, and entomologists are still watching the neighborhood of the threatened outbreak. In South Africa, as everywhere else, housewives need brooms, and broom factories exist to supply the demand. Broom corn has to be imported from Europe and South America, because the locally raised crop is not sufficient. Inspections of baled European broom corn have shown the presence of the borers in the stalks, just as they were in the stalks of European broom corn imported into Canada and the United States some years ago, from which the present plague there got its start.

In the yard of a Johannesburg broom factory a few chance stalks of broom corn sprang up from stray seeds, and these were found to be infested with young borers. They were promptly obliterated, and every kitchen garden for blocks around was inspected inchwise by frantic entomologists. So far as known at present, not a single borer escaped the search, but the watch will have to be kept up for several years to make sure the clean-up was complete.

In the meantime, the Union has passed stringent inspection regulations for imported broom corn. None may be brought in unless it has been freed of all stalks large enough to harbor a borer. In the factories the bales are stored in mothproof rooms kept rigidly under lock and key, and the few workmen who have access to them are put through the same elaborate ritual on leaving as employes of a mint.

South Africa already has one pest in its cornfields, which it considers more than sufficient. This is the stalk borer, a creature related to the European corn borer and having much the same habits. Recommendations to the South African farmer for its control are reminiscent of those now being published in the American corn belt for the control of the European corn borer.

Science News-Letter, July 28, 1928

Studies How Women Walk

Anatomy

More than half of the women of the present day walk with their feet toeing straight ahead, Indian fashion. About 41 per cent. toe out after the old dancing school pattern. Only about 5 per cent. of the women you see on the streets are pigeon-toed.

These are the conclusions of Dr. John W. Crist, of Michigan State College. Dr. Crist gathered his statistics by standing on busy street corners during his spare time, and unobtrusively recording the walking habits of some 11,000 women in various cities of the United States.

Reporting his investigations in the forthcoming issue of the *Journal of Heredity*, Dr. Crist states that the ancestors of the human species walked on all fours, and their feet must have curved inward to help in grasping trees, as the apes' feet curl. Babies are inclined to turn the soles of the feet toward each other, and many babies can even bring the soles of the feet together. They soon lose this pigeon-toed tendency, however, and, so far as women are concerned, the feet even swing past the straight position and tend to turn out in many cases. For some of his figuring, Dr. Crist found it necessary to estimate the ages of feminine pedestrians, making due allowance for facial camouflage. Among the women that he set down in the "over 40" list, about three-fourths toed out. But this great increase in toeing out among older women is not due to age, he later concluded. Weight is the more important factor. As heaviness increases with age, the feet respond by turning outward.

Eighty per cent. of the heavily built women over 40 toed out. But only 40 per cent. of the light weight women over 40 turned out their toes fan fashion.

Whether this position of the feet is more efficient in carrying and balancing the heavy and unequally distributed load of a heavy woman might be investigated by a physicist, Dr. Crist suggests.

Science News-Letter, July 28, 1928

Strange Tree With Many Uses

Forestry

ALEXANDER PORTEOUS, in *Forest Folklore, Mythology, and Romance* (Macmillan):

In Africa, particularly in Senegal, and in some of the islands not far from the African coast, grows the Baobab (*Adansonia digitata*). Of all the trees in the world it is supposed to be the largest as regards the thickness of its whitish, conical trunk, which, however, rises only to a height of about fifteen feet before it branches, while its circumference is often more than one hundred feet. From the summit of this trunk numerous thick branches, from thirty to sixty feet long, branch off horizontally in all directions, and, as they gradually become shorter farther up the stem, the tree takes the appearance of a gigantic dome. The leaves resemble the fingers of the human hand, from which the naturalist Adanson gave it the specific name of *digitata*, its generic name being his own. The blossoms are of a proportionate size, are of a snowy white, and are regarded with a peculiar reverence the moment they burst into bloom. The fruit, large, oval, and resembling a cucumber, is a great favorite with monkeys, the tree being sometimes called Ape's-bread Tree, Monkey's Bread, and Ethiopian Sour Gourd. Adanson stated that these trees grow in plains of barren movable sand, and where the water of a river had washed this sand away the roots were left exposed. These roots, he said, measured over 110 feet in length. The short, thick trunk is necessary to support the overwhelming superincumbent mass of leaves, and seen from a distance the Baobab resembles a small forest rather than a single tree. Under the vast shadow, often 450 feet in circumference, cast by this tree, the negroes enjoy repose, and often find refuge from the storm. The negroes of Senegambia are said to worship these trees as divinities. When time, in the course of ages, has hollowed out the stem of one of these noble trees, it often becomes the abode of a negro family. Sometimes the hollow forms a place of amusement, sometimes a prison, and one tree is known in Senegambia which has been converted into a Council Hall, the entrance being covered with appropriate sculptures. Another use to which the negroes put these hollow trees is for the burial of their poets, buffoons, and musicians in the cavity. They consider them to be inspired by demons, so they will suffer the bodies neither to be buried in the earth nor thrown into the sea, lest the fruit or the fish should perish. Thus, to avert their doing harm to land or sea, they are placed in these hollows where they soon dry up. As these trees commence to decay downwards at the point where the branches spring forth, the hollow space thus formed fills with water during the rainy season and forms an excellent cistern, the water being kept cool by the overhead foliage. Those villages which are fortunate enough to possess such a tree sell the water to travelers. Many of these trees in Senegal are computed to be about five or six thousand years old. In one of the Cape Verde Islands Adanson found a Baobab bearing in its interior an inscription which had been traced there by the English three hundred years previously. From that, and by measuring the stems of many of the trees, he calculated that the most vigorous specimens might be at least five thousand years old.

Science News-Letter, July 28, 1928

In early times the Greeks used Phoenician vessels to carry their cargoes overseas.

Because of the sugar content of honey, bacteria harmful to health do not multiply in it.

Specimens of the extinct Labrador duck are rarer than those of the famous great auk.

The boundary between the United States and Canada is to be marked on all the international bridges between the countries.

Citronella oil is obtained from a grass cultivated in Ceylon and Java.

There are more than half a million domesticated ostriches in South Africa.

Some native tribes of South America believe that moonlight is bad for babies.

A survey in New York state indicates that there is 60 per cent. more sickness in villages than on farms, largely because there are more older people in the villages.

Reading Character—*Cont'd*

is macrosplanchnic is most likely to be extroverted; that is, somewhat of manic-depressive makeup. In contrast, most of the microsplanchnic students are introverted or, in other words, slightly schizophrenic in mental make up.

All the experimental trends indicate that for some outstanding but complex mental make-ups there are closely associated body builds or constitutions, which are also complex. They do not indicate any simple and infallible way of reading the character of our enemies, or supposed friends. But in the hands of a skilled person even the present findings can be of tremendous helpfulness in laying out a program for mental hygiene for an individual or in indicating precautions each individual should follow to maintain good physical health.

Perhaps within the year some modern Fritsch will announce to a waiting scientific world the results of researches which will simplify and strengthen the findings I have outlined for you. While I am not expecting any such announcement, the progress of the world of science has been so astounding within the present decade that I refuse any longer to be of a closed mind.

NOTE. In the three pairs of photographs on page 45, James is more intelligent than Robert, Frank is more intelligent than Richard, Orville, is more intelligent than Edward. And just to show how clothes may alter judgment, Robert and Edward are the same person.

Lines 1, 2, 5, 7 and 9 of the samples of handwriting were written by women.

And as for the woman on the cover page—"she" is a railroad shop woman as he appeared in a church play. Undoubtedly, "she" is not to be trusted!

Science News-Letter, July 28, 1928

Staff of Science Service—Director, Edwin E. Slosson; Managi. Editor, Watson Davis; Staff Writers, Frank '. .one, James Stokley, Emily C. Davis, Jane Stafford; Librarian, Minna Gill; Sales and Advertising Manager, Hallie Jenkins.

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Grand Canyon Observatory Planned

Astronomy

With the cooperation of French glass manufacturers a huge observatory, dwarfing all present institutions, is planned for the best location in the vicinity of the Grand Canyon of the Colorado in Arizona. This announcement was made recently to Science Service by Prof. George W. Ritchey, famous American astronomer who has been working in Paris for the last five years.

Prof. Ritchey first went to Paris in connection with the plans of a wealthy Hindu, the late Assan Dina, to build an observatory on Mont Saleve, in the French Alps, at a cost of $6,000,000,000. He had built the 60-inch reflector of the Mt. Wilson Observatory as well as the optical parts of the 100-inch reflector, still the world's largest telescope, so he was placed in charge of the research to develop methods of building still larger instruments.

About two years ago Dina withdrew his support after the expenditure of about $40,000, but Prof. Ritchey has continued his work at the Paris Observatory, with the aid of M. Delloye, head of the St. Gobain glass works, where the glass for most of the world's biggest telescopes has been made. The present plans include a great observatory at the Grand Canyon, in Arizona, which Prof. Ritchey believes to be one of the best astronomical sites in the world. The telescope is intended to be of a new type, in which a pair of mirrors reflect the star's light down to a huge concave mirror. There will be several of these mirrors, with different magnifying powers, and they can be changed at a moment's notice, to take advantage of short changes in atmospheric conditions. The mirrors will not be of solid glass, but built up in a fashion somewhat resembling a honeycomb, by a method that Prof. Ritchey has developed. The curves to which they are ground will also be new, having been worked out by Prof. Ritchey in conjunction with Prof. Henri Chretien, a French astronomer. Tests of mirrors made according to these curves have demonstrated their superiority.

When asked what effect Dina's recent death would have on his plans, Prof. Ritchey stated that he knew nothing of the future of the Dina project and that his own work was entirely independent. He has received no word from Mme. Dina, who, according to one report, expects to return to her late husband's original ideas and build the observatory on Mont Saleve.

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Yellow Fever Epidemic in Brazil

Medicine

United States Quarantine officers in all ports south of Norfolk, Va., have just been instructed by the chief of the quarantine division of the U. S. Public Health Service to be on the alert for cases of yellow fever. An epidemic of this disease is reported from Brazil, where 87 cases and 29 deaths have been reported, according to figures received today by the U. S. Public Health Service.

Of these, all the deaths and 79 cases are from Rio de Janeiro. Probably many more have occurred but have not been reported. Those that have been reported are all from seaports. Conditions in the interior are still unknown.

The danger of yellow fever breaking out in the United States when there is an epidemic in Central and South America is always acute. The yellow fever mosquito, *Aedes egypti*, is still plentiful in the southern part of this country and just one bite of a yellow fever patient is all the mosquito needs to start an epidemic of the disease here.

Contrary to popular belief, yellow fever has not been wiped from the face of the earth. Although it has been kept out of the United States and Europe, it is still a very great menace. Two main centers of the disease exist. One is in Africa where Noguchi and two associates recently died of the disease in the course of their investigations on it, and the other is in South America. A flare-up from either center is always possible, just as cholera and plague frequently spread to epidemic proportions from their centers in India.

Recent investigations point to a reservoir of yellow fever in certain monkeys of Africa, and public health officials here believe that a similar animal or mosquito or even human reservoir exists in South America. These reservoirs consist of subjects that have been infected and recovered, but that are capable of transmitting the disease to others.

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Nature Ramblings

By Frank Thone

Natural History

Rulers of Wayside and Water

Summer brings a shift of the center of flowering activities from the sheltered woodlands to the open. Prairies and pastures and marshes and wayside wasteland give back to glowing sun and hot sky bright images of themselves in yellow and strong blue.

King over this brave array reigns the goldenrod. There is no other summer flower like it, though confessedly the wild aster makes a fair consort. But for sturdy defiance of heat, for ability to thrive in all sorts of odd corners, and even for a cheerful appearance in the face of the curse of roadside dust, the goldenrod wins out over all comers.

Goldenrod is easy to cultivate, and would doubtless be welcomed in many a garden if it were not for the legend that it causes hay fever. That this is a base slander many times exposed and exploded does not seem to have got home to the great majority of possible goldenrod appreciators. But medical authorities are practically unanimous on the point. Hear, for instance, Dr. W. Scheppegrell, of the American Hayfever Prevention Association: "The pollen of the goldenrod may cause a reaction when applied directly to the nostrils, or when used in large quantities for room decorations. As far as being a cause of hay fever, however, it is absolutely negligible."

Goldenrod is often called the American national flower. As a matter of fact, there is no American national flower, in spite of over a century of discussion on the subject. Goldenrod, however, is a favorite contender, running about even with the choice of many other people, the columbine.

Still summer waters are now yielding their loveliest harvest—the white water lilies. *(Turn to next page.)*

Nature Ramblings—*Cont'd*

Beautiful as any flower that can be imagined by a poet, serene on the steely, polished surface of their ponds and bayous, aloof as though by choice from the crowding competition of plants that love the land, they appeal alike to the philosophic and the romantic temperament.

Moralists might point to them as a lesson that loveliness need not be dependent on aristocratic ancestry. For according to the botanical social register, water lilies rate close to the foot of the flowering hierarchy, being among the more primitive plants. Nor need beauty spring from an exquisite environment, for water lilies are of necessity rooted in the blackest and ooziest of mud. They are the meek, who have inherited only the water, and they are what they are by their own fair nature and the grace of God.

Water lilies, it is hardly necessary to state, are not lilies. They are pure white like lilies, but that is about their only point of resemblance. The mark of the true lily is having its flower exactly six petal-like sections, never more and never fewer. The water lily has many sepals and petals—twenty or thirty or even more. The Germans call it "Wasserrose," which means water rose; but that is quite as far from the point, for it is about as far removed from the roses as it is from the lilies. Botanists disagree between two names, both of them beautiful: *Castalia* and *Nymphæa*. It is a pity that one of them can not be popularized—*Nymphæa* for choice.

Science News-Letter, July 28, 1928

A survey of doctors in towns of 1,000 people or less in the United States showed that almost one-third of these towns that had doctors in 1914 had none at all in 1925.

No amount of experimentation can ever prove me right. A single experiment may at any time prove me wrong.

—*Albert Einstein.*

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The Puff-Adder

Metaphysics

THOMAS THORNELY, in *The Spectator*

On thy loathed form a problem hangs—
How came so vile a thing to be,
If quivering hate and venomed fangs
Owe not their birth to deviltry?
Was each foul trait a thought divine?
Or was the dark imagining thine?

Was all decreed, no chance, no choice,
No mingling of a "may" with "must,"
But Doom's inexorable Voice—
"Brew death, and lurk in desert dust?"
Or, ere the shaping Hand was still,
Was beauty marred by chosen ill?

If thou couldst urge that in thee lies
The seed of better things to be,
We might offset thy future rise
Against thy present infamy;
But who has ever found a trace
In thee of supervenient grace?

So we must darkly ponder still
What broods behind that baleful hiss;
Or shape, as shallow sophists will,
A specious, soothing synthesis,
And, fusing God with Nature, show
Since He is good, all must be so!

Science News-Letter, July 28, 1928

An automatic subterranean cable-laying machine is being tested in Germany.

About Buying Books—

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How To Keep Scraps

Bibliography

By Edwin E. Slosson

One of our readers writes to inquire the best way to keep a scrap-book. It was lucky that the letter was sent to me instead of somebody else, because this is one of the things that I think I know and that I think most people do not know. At any rate, I can give our correspondent the three fundamental principles of the science of scrapping and let him apply them to his own and then, if the system does not work, it is not my fault. Whatever he does he should not buy a scrap-book.

The primary requisites of a useful system of scrap-keeping are, first, celerity; second, mobility; third, classification by subjects. The scrap-book in any form is practically ruled out of consideration by all three rules, for it requires some bother to paste clippings in a scrap-book even if ready gummed, and still more to take them out for rearrangement, and it separates the clippings from all matter in other forms bearing on the same subject. The data that one collects in the course of weeks or years for some article or lecture come in all forms, pamphlets, magazine articles, newspaper clippings, letters, notes and perhaps maps, diagrams and pictures. It is of the utmost importance that these be brought together. To keep them in different places because they happen to be in various shapes is like classifying a library by putting the octavos in one case and the duodecimos in another, or arranging them according to the color of their binding. With books, in fact, it does not so much matter, for few of us are blest with such a large number of them that we cannot find the one we want in the dark, but scraps and clippings are more numerous, more fugitive and more valuable than books. A book that is lost can usually be replaced for a dollar or so, but an item you cut from an unknown newspaper or a note you jotted down *à la* Pope on the back of an envelope may be worth much more to you and is irrecoverable. Formerly librarians in large libraries used to despise pamphlets, while clippings were altogether beneath their notice. Nowadays they no longer despise pamphlets, they merely hate them, and they are beginning to take notice of clippings. One of the most valuable of the assets of a large daily is its "morgue," which, starting as a repository for obituary material collected in advance of the occasion for its use, has become an elaborate clipping bureau in constant requisition. In fact, it may be said that the morgue contains the live matter and the library the dead.

One rarely knows in advance just why he is collecting along a certain line; it is a sort of instinct like that of a squirrel gathering nuts for winter. It may turn out a song and it may turn out a sermon. The mind and the "scrap-book" should develop together, expanding, ramifying and rearranging until some day comes the occasion or the central thought, and the whole mass of material arrives at its conscious reason for existence. Mobilization and segregation must be continuous processes, and that is why I object to such a scattering of forces as is involved in the system used by many persons whom I otherwise respect, those who keep their notes in a card index, letters in letter files, clippings in scrap-books and pamphlets in boxes.

The best way of keeping together all the material on a given subject, "printed or written or partly printed and partly written," as the lawyers say, is to put it in manila envelopes and these in a vertical letter file. The envelopes should be large enough to hold typewriter paper unfolded, that is, about 9 by 11½ inches. Some will prefer the folders without sides, such as are generally used in filing letters, instead of envelopes, as being a little easier of access. If clippings alone are filed *(Turn to next page)*

New Pterosaur Found

Paleontology

A fossilized wing-bone of a pterosaur, recently sent from Oregon to the U. S. National Museum for examination, has given the first indication of how these great flying lizards of dinosaur days lightened their bones to combine a maximum of strength with a minimum of ballast. Birds, the most successful of modern flying vertebrates, have thin-walled, hollow bones with air spaces inside, on the plan of the tubular metal braces and struts of the larger airplanes. The pterosaurs, this specimen shows, had not evolved so highly perfected a device. Their bones were not completely hollow, but the cavity was filled with a very light, spongy webwork of bony tissue, which served as cross-braces to strengthen them.

All bones of flying lizards hitherto found have been crushed flat, Dr. J. W. Gidley, paleontologist of the Museum, explained. This gives the present specimen *(Turn to next page)*

Man's Origin Sought in China

Anthropology

The footsteps of Marco Polo will be followed by Prof. George B. Cressey, Shanghai College geologist, who is now en route to Kansu and Inner Mongolia, where he will study the ancient past of those remote districts of China.

New evidence of the origin of man may be unearthed by Prof. Cressey, although his principal studies will be upon the climate of Asia during the past ten millions of years.

Whether the people of the overcrowded plains of China will be able to emigrate to the great expanses of empty land in Mongolia, as some writers have urged, may be determined by agricultural studies to be made by Professor Cressey.

The area to be explored lies in Western Inner Mongolia, north of the Great Wall from Kansu. Except for irrigated strips along the Yellow River all of this region is a desert. In the center of the area lie the great Alashan range of mountains which rise to over 10,000 feet and divide the desert into two distinct regions; the Alashan desert on the west and the Ordos on the east. The Ordos includes the district within the great northward bend of the Yellow River outside the Great Wall.

Although an ancient Mongolian trade route crosses this district, it has seldom been followed by foreigners. Except for the few trails most of the Ordos and Alashan is quite unknown, both geographically and geologically. Marco Polo crossed the area on his journey to China, and during much of the summer the expedition will be following in his footsteps. The Chinese city of Ninghsia and the Mongol trade center of Wang Yeh Fu will be the headquarters for work.

"During the Glacial Period in Europe and North America, Asia was free from ice," *(Turn to next page)*

How to Keep Scraps—*Continued*

a long envelope, about 4 by 9½ inches, holding a column, is more convenient. The vertical filing cases may be obtained in sections and expanded as desired. Or you can make your own box to fit the envelopes and get some kind friend to pyrograph or carve it with your book-plate. The envelopes may be saved from the mails fast enough if you do not care to buy them.

The best system of classification and arrangement for most people is none at all. When you cut a paragraph from a paper or copy a quotation or note a reference or invent an epigram, run your hand along the top of the envelopes, reading their contents until you instinctively find the one where it belongs, drop it in and write the title or key-word of it on the envelope. If it does not seem to be irresistibly attracted by any of the existing envelopes, do not hesitate to give it one of its own and it will not long remain lonely. Hundreds of envelopes and thousands of scraps can be kept accessible at a moment's notice. The only points to be observed are to list every item, however small, on the envelope unless already covered by a title there, and to scratch it out when you remove it. A slipping on divorces in France would be safely lost in an envelope marked "Sociology, continued," but if it is in an envelope with "Divorces in France" written on it you can find it no matter what its companions may be. When you get hold, no matter how, of a good story, illustrating, say, partisanship in politics, do not put it into an envelope marked "Humorous III," but in one containing some other political material, however serious, and scribble "Party Politics (Anecdote)" on the outside; then when you are called upon suddenly for a toast, as you usually are, there are the story and its point side by side. But don't forget to mark on any clipping the name and date of the periodical or paper from which it was taken, so you can cite it if necessary.

The Science News Letter is planned primarily for clipping, for the news articles are so printed that any of them can be cut out without damage to any other and each bears the source, date and department of science. This classification is based upon that of the Library of Congress, which has come into common use in this country since the Government prints index cards of all the new books. An "Outline Scheme of Classes" of the Classification of the Library of Congress may be purchased from the Superintendent of Documents, Government Printing Office, Washington, for ten cents.

If your local library uses the Dewey Decimal Classification you may find this preferable for your own files. We print occasionally in the SCIENCE NEWS LETTER the outline of the main classes and key letters or figures of both the Dewey and the Library of Congress system.

Of course, if you have nothing to do but keep a scrap-book, or if you have a private secretary or a large family of unusually careful and helpful children, you can work out your own system of classification and index and cross index *ad libitum*. But unless you have the stamina to keep up a diary do not undertake a card index.

We do not say that the old-fashioned scrap-book has not its uses. You will find it convenient, for example, to keep one, as handsomely bound as you please, as a sort of family record, for such kindly references as it has pleased the press from time to time to bestow on you and yours. You may put into it the praise your book or your speech received, the biographical sketches of yourself, the banquets you have attended, and all such memorabilia, for the purpose of handing it down to posterity, for you may be sure that your grandchildren will pore over it as frequently and lovingly as you do over your grandfather's letter book.

Science News-Letter, July 28, 1928

Man's Origin Sought in China—*Continued*

Professor Cressey explained. "Mongolia, furthermore, apparently had a much more moist climate. This problem is of more than theoretical interest for climate controls vegetation, and thus influences animal life. Since Asia seems to have been the center of human evolution, climate throws light on the habitability of this area. The record of climate is written in sediments and erosion cycles, and the preliminary studies made in 1924 indicate that this area contains critical information. While no direct search is to be made for ancient man, it is important to note that the best evidence of early man so far found in Central Asia is on the borders of the Ordos.

"The desert is the geologist's paradise. All the agents of erosion and transportation are actively at work, for, despite the limited rainfall with which they carry on their work, there is no protecting vegetation. Geologic processes are demonstrated on every hand, often in text-book perfection.

"Geologically the map is white, and large areas are geographically unknown as well. Prejevalsky and Obruchev, two Russians, visited the region sixty years ago, and most of our knowledge dates back to them."

Professor Cressey has over 2000 miles of travel in Inner and Outer Mongolia to his credit. Both the Ordos and the Alashan were visited by Professor Cressey in 1924 on the return from an expedition to Koko Nor in Tibet. There was no opportunity for detailed studies at that time, but hasty examination indicated several promising areas. Since that time the few available reports of earlier explorers have been examined and definite projects mapped out.

An attempt to continue work in 1926 resulted in an attack by brigands before the area was reached. Mongolia itself is characteristically peaceful, but the Chinese borderlands are often in an unsettled condition. Reports indicate that conditions along the route which it is now proposed to follow are quiet.

Science News-Letter, July 28, 1928

New Pterosaur—*Continued*

unique interest and importance. A further note of interest is found in the fact that this pterosaur comes from Oregon, and represents the farthest west of all flying reptile finds to date.

The find consists of the humerus or upper arm-bone and two vertebrae. The humerus is about eight inches long and one and one-half inches in diameter at its ends. At the slenderest part of the middle of the shaft it is three-quarters of an inch in diameter.

The upper arm-bone accounted for a relatively small part of the wing-span in the flying reptiles. The fore-arm bone was somewhat elongated, and what corresponded to the finger-bones of one of the fingers were greatly exaggerated. Only one of the fingers supported the wing; the others were short and apparently of use in clinging or climbing.

Science News-Letter, July 28, 1928

There are high mountains in the Sahara Desert.

FIRST GLANCES AT NEW BOOKS

THE BEAVER IN YELLOWSTONE NATIONAL PARK, and NOTES ON THE BEAVER IN ESTES PARK, COLORADO—Edward R. Warren—*Roosevelt Wild Life Forest Experiment Station* ($2.50). Mr. Warren has merited the approval and thanks of all naturalists interested in the ways of the beaver by his intimate and exhaustive study of their work in two easily accessible and well-protected areas in the West. The volume containing these two papers constitutes Vol. 1, Nos. 1, 2 of a new series of publications, Roosevelt Wild Life Annals, which will provide for papers whose length and technical nature take them outside the scope of the Roosevelt Wild Life Bulletin. Subscription to the Annals will be at the rate of $5 per volume of four numbers, or $1.25 for a single number.

Mammalogy
Science News-Letter, July 28, 1928

OUR WILD ANIMALS—Edwin Lincoln Moseley—*Appleton* ($1.75). A guide to the common wild animals of America.

Zoology
Science News-Letter, July 28, 1928

THE INDIANA SAND DUNES AND SHORE LINES OF THE LAKE MICHIGAN BASIN—George B. Cressey—*Univ. of Chicago* ($2). A comprehensive survey of the geology and geography of one of the most unique and interesting dune areas in the world, attractively presented and excellently illustrated.

Geology-Geography
Science News-Letter, July 28, 1928

KEEPING YOUNG AFTER FORTY—Eugene R. Whitmore—*Appleton* $1.50). Excellent advice for those who want to stay efficient though forty or forty plus. No elixir of youth but sound common sense.

Hygiene
Science News-Letter, July 28, 1928

A COMPREHENSIVE SURVEY OF STARCH CHEMISTRY—Robert P. Walton—*Chemical Catalog* ($10). The first volume of a symposium that is intended to present the various phases of starch chemistry and technology.

Chemistry
Science News-Letter, July 28, 1928

LABORATORY GLASS BLOWING—F. C. Frary, C. S. Taylor and J. D. Edwards—*McGraw-Hill* ($1.50). A new and enlarged edition of this useful book that has a place in every laboratory. It tells all the approved methods for the usual kinds of manipulation of glass that are so often required.

Chemistry-Physics
Science News-Letter, July 28, 1928

HARDY EVERGREENS—Frank A. Schrepfer—*Orange Judd* ($1.25). The growing vogue for small ornamental conifers makes a yard look incomplete without at least a few of them, but woe to the man who plants the wrong kind, or puts his trees in the wrong place, or fails to learn wherein they demand different treatment from deciduous trees and shrubs. This book guides one safely out of these and other pitfalls.

Horticulture
Science News-Letter, July 28, 1928

SPRING FLOWERING BULBS—Clark L. Thayer—*Orange Judd* ($1.25). This small volume tells how to get the best results with bulbs, what kinds to plant and when; it lists and describes the outstanding named varieties; and finally gives hints on how to run a flower show, which is always a lot of fun.

Horticulture
Science News-Letter, July 28, 1928

HARDY SHRUBS—Frank A. Waugh—*Orange Judd* ($1.25). The home owner who wants to spruce his place up and make his house look at home on its lot will do well to consult this little book. It gives the salient facts about the most commonly used and dependable shrubs, and tells how to take care of them.

Horticulture
Science News-Letter, July 28, 1928

BUSH FRUIT PRODUCTION—R. A. Van Meter—*Orange Judd* ($1.25). In brief compass this book tells about the principal bush fruit crops and how to plant and care for them.

Horticulture
Science News-Letter, July 28, 1928

SPRING IN THE LITTLE GARDEN—Frances Edge McIlvaine—*Little, Brown* ($1.75). A charming little book for the owner of a small place. Hardy perennial herbs come in for special attention. The illustrations are above average for this class of books.

Horticulture
Science News-Letter, July 28, 1928

PRACTICAL POULTRY FARMING—L. M. Hurd—*Macmillan* ($3.50). This book, a very worthy addition to the Rural Science Series, compacts into a matter of 400 pages a lot of basic information about the care, feeding, housing, marketing and "doctoring" of poultry. It will be useful either as text for the classroom or as a vade-mecum for the poultryman.

Animal Husbandry
Science News-Letter, July 28, 1928

REACHING OTHER MINDS—Davida McCaslin—*Knopf* ($1.75). This professes to be a text-book for teaching Freshman composition, but one would never suspect it from the looks for it has nothing of the dry, dogmatic and dictatorial air common to the classroom. Miss McCaslin, who is professor of rhetoric in James Millikin University, is evidently more concerned with getting her students to think for themselves than she is with drilling them in the following of the grammatical form of dead authors. She starts all sorts of live questions and then leaves them unsettled—hanging in the air, so to speak, in the hope that some bright boys and girls will be tempted to reach up and grab at them. This would be a disturbing textbook for a teacher who wants to have a quiet time and never be asked any question not already answered.

Rhetoric
Science News-Letter, July 28, 1928

GOOD ENGLISH—Virginia C. Bacon—*American Library Associaiton* ($.35). This volume of the "Reading with a Purpose Series" aims to help those who wish to improve their English both in speaking and writing. The books recommended are: Grammar to Use, by William D. Lewis and Helen M. Lynch (Winston); Correct English Complete Grammar and Drill Book, by Josephine Turck Baker (Correct English Pub. Co.); Century Handbook of Writing, by Garland Greever and Easley S. Jones (Century); Self-Aids in Essentials of Grammatical Usage, by L. J. O'Rourke (Educational and Personnel Pub. Co.); Expressive English, by James C. Fernald (Funk and Wagnalls).

Rhetoric
Science News-Letter, July 28, 1928

HAVELOCK ELLIS, PHILOSOPHER OF LOVE—Houston Peterson—*Houghton Mifflin* ($4.50). The book grew from plans and material for a comprehensive essay on Ellis, according to the author. It is not like the modern, semi-fictional biography and the dramatic features of Ellis' life, of which there were plenty, are not played up. The facts are given only as they affected the development of his philosophy. Much of the book is devoted to discussion of Ellis' writings and the events, people and books which influenced them.

Biography
Science News-Letter, July 28, 1928

The Species Question

Botany

DEANE B. SWINGLE, in *A Textbook of Systematic Botany* (McGraw-Hill):

One taking an impartial view of the species question is forced to this conclusion: that for most of the plant kingdom the bold Linnæan type of species is simpler than the finely divided elementary species, and serves every essential purpose; but in certain groups it is necessary to make finer distinctions for research reference, though even there the majority of botanists may not need to do so for their more general work. The natural answer is to assemble the individuals into relatively few, large, clear-cut species and where necessary have additional fine distinctions to be used only by those who have special need for them. Various terms have been used to designate these finer divisions, such as subspecies, varieties, races, types, and forms. It has been suggested by N. L. Britton that they be merely numbered rather than named and this plan has much in its favor. To be sure this introduces the trinomial nomenclature, but if this is cumbersome it has the advantage of showing relationship, for the specific name connects the subspecies to each other and the plan finds precedent in the type numbers of certain pathogenic bacteria.

Varieties or races based on fine distinctions of a somewhat permanent character must not be confused with ecological or environmental forms of a temporary nature. It is well known that closely related individuals growing in different habitats may vary considerably, so much indeed that they are sometimes called different species. It would be desirable, though sometimes impracticable, to have representatives of related species grown side by side for comparison. Such a test would eliminate many superfluous specific names from our manuals. It would also involve, in some cases, the practice of including in the specific description qualifying statements concerning the effect of environment, and corresponding records showing the habitat of the specimen in question. The work now being done in this field by ecologists will greatly strengthen our taxonomic systems.

Generic distinctions, and those of higher categories, give much less trouble. To be sure there is some difference of opinion as to what categorical rating should be given to certain groups, *e. g.*, whether they should be considered orders or families, families or tribes, genera or subgenera. In fact, several families have been divided in recent years, and some would now call the legumes and the composites orders rather than families. These differences are not disturbing, however. Because of the absence of gradations in characters used in class, order, and family distinctions there is usually little difficulty in placing a plant correctly in these groups, and even generic classification is seldom troublesome.

Science News-Letter, July 28, 1928

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Primordial Hunger

Evolution

P. D. GOG, in the *Chicago Post:*

If I were an ameba
And you were an euglena,
I would pursue you
For a thousand millimeters,
Until I caught you,
And embraced you,
And absorbed you,
And made you all my very own.
Thus would we two be one,
Living in our crystal drop of water
Until the seconds of our life had sped—
And I would die content.

Science News-Letter, July 28, 1928

THE LIVING TEXTBOOK

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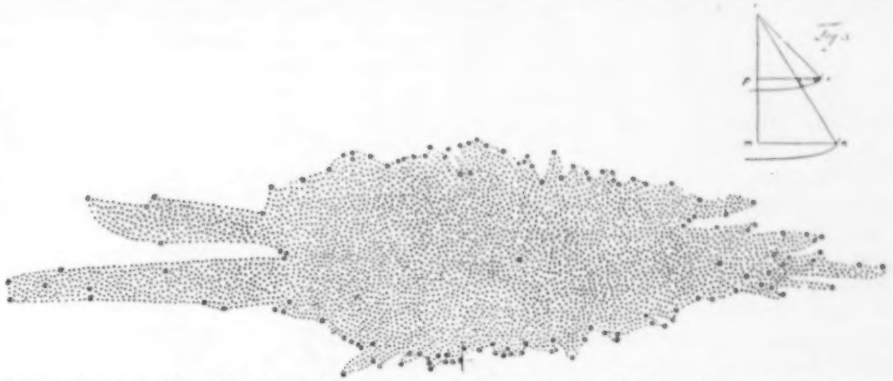
CLASSICS OF SCIENCE: The Island Universes

Astronomy

Herschel counted the stars in 683 telescopic fields to get the data from which he calculated the extent of the stars in every direction. He came to the conclusion that the stars immediately around us are all contained in one cluster similar to the clusters which we know as nebulæ. Those, he found, are so far from our group that each must be thought of as an "island universe" in space.

ON THE CONSTRUCTION OF THE HEAVENS. By William Herschel, Esq., F. R. S., in Philosophical Transactions of the Royal Society of London. Vol. LXXV. For the Year 1785.



THE SHAPE OF OUR UNIVERSE as calculated by Sir William Herschel. Our sun is not far from the center, and we see the thickest part of the crowd of stars as the Milky Way.

Theoretical View

Let us then suppose numberless stars of various sizes, scattered over an indefinite portion of space in such a manner as to be almost equally distributed throughout the whole. The laws of attraction, which no doubt extend to the remotest regions of the fixed stars, will operate in such a manner as most probably to produce the following remarkable effects.

Formation of Nebulæ

Form I. In the first place, since we have supposed the stars to be of various sizes, it will frequently happen that a star, being considerably larger than its neighboring ones, will attract them more than they will be attracted by others that are immediately around them; by which means they will be, in time, as it were, condensed about a center; or, in other words, form themselves into a cluster of stars of almost a globular figure, more or less regularly so, according to the size and original distance of the surrounding stars. The perturbations of these mutual attractions must undoubtedly be very intricate, as we may easily comprehend by considering what Sir Isaac Newton says in the first book of his Principia, in the 38th and following problems; but in order to apply this great author's reasoning of bodies moving in ellipses to such as are here, for a while, supposed to have no other motion than what their mutual gravity has imparted to them, we must suppose the conjugate axes of these ellipses indefinitely diminished, whereby the ellipses will become straight lines.

Form II. The next case, which will also happen almost as frequently as the former, is where a few stars, though not superior in size to the rest, may chance to be rather nearer each other than the surrounding ones; for here also will be formed a prevailing attraction in the combined center of gravity of them all, which will occasion the neighboring stars to draw together; not indeed so as to form a regular or globular figure, but however in such a manner as to be condensed towards the common center of gravity of the whole irregular cluster. And this construction admits of the utmost variety of shapes, according to the number and situation of the stars, which first gave rise to the condensation of the rest.

Form III. From the composition and repeated conjunction of both the foregoing forms, a third may be derived, when many large stars, or combined small ones, are situated in long extended, regular, or crooked rows, hooks, or branches; for they will also draw the surrounding ones, so as to produce figures of condensed stars coarsely similar to the former which gave rise to these condensations.

Form IV. We may likewise admit of still more extensive combinations; when, at the same time that a cluster of stars is forming in one part of space, there may be another collecting in a different, but perhaps not far distant quarter, which may occasion a mutual approach towards their common center of gravity.

V. In the last place, as a natural consequence of the former cases, there will be formed great cavities or vacancies by the retreat of the stars towards the various centers which attract them; so that upon the whole there is evidently a field of the greatest variety for the mutual and combined attractions of the heavenly bodies to exert themselves in. I shall, therefore, without extending myself farther upon this subject, proceed to a few considerations, that will naturally occur to every one who may view this subject in the light I have here done.

Objections Considered

At first sight, then, it will seem as if a system, such as has been displayed in the foregoing paragraphs, would evidently tend to a general destruction, by the shock of one star's falling upon another. It would here be a sufficient answer to say, that if observation should prove this really to be the system of the universe, there is no doubt but that the great Author of it has amply provided for the preservation of the whole, though it should not appear to us in what manner this is effected. But I shall, moreover, point out several circumstances that do manifestly tend to a general preservation; as, in the first place, the indefinite extent of the sidereal heavens, which must produce a balance that will effectually secure all the great parts of the whole from approaching to each other. There remains then only to see how the particular stars belonging to separate clusters will be preserved from rushing on to their centers of attraction. And here I must observe, that though I have before, by way of rendering the case more simple, considered the stars as being originally at rest, I intended not to exclude projectile forces; and the admission of them will prove such a barrier against the seeming destructive power of attraction as to secure from it all the stars belonging to a cluster, if not for ever, at least for millions of ages. Besides, we ought perhaps to look upon such clusters, and the destruction of now and then a star, in some thousands of ages, as perhaps the very means by which the whole is preserved and renewed. These clusters may be the *Laboratories* of the universe, if I may so express *(Turn to next page)*

The Island Universes—*Continued*

myself, wherein the most salutary remedies for the decay of the whole are prepared.

Optical Appearances

From this theoretical view of the heavens, which has been taken, as we observed, from a point not less distant in time than in space, we will now retreat to our own retired station, in one of the planets attending a star in its great combination with numberless others; and in order to investigate what will be the appearance from this contracted situation, let us begin with the naked eye. The stars of the first magnitude being in all probability the nearest, will furnish us with a step to begin our scale; setting off, therefore, with the distance of Sirius or Arcturus, for instance, as unity, we will at present suppose that those of the second magnitude are at double, and those of the third at treble the distance, and so forth. It is not necessary critically to examine what quantity of light or magnitude of a star entitles it to be estimated of such or such a proportional distance, as the common coarse estimation will answer our present purpose as well; taking it then for granted, that a star of the seventh magnitude is about seven times as far as one of the first, it follows that an observer, who is inclosed in a globular cluster of stars, and not far from the center, will never be able, with the naked eye, to see to the end of it: for, since, according to the above estimations, he can only extend his view to about seven times the distance of Sirius, it cannot be expected that his eyes should reach the borders of a cluster which has perhaps not less than fifty stars in depth everywhere around him. The whole universe, therefore, to him will be comprised in a set of constellations, richly ornamented with scattered stars of all sizes. Or if the united brightness of a neighboring cluster of stars should, in a remarkably clear night, reach his sight, it will put on the appearance of a small, faint, whitish, nebulous cloud, not to be perceived without the greatest attention. To pass by other situations, let him be placed in a much extended stratum, or branching cluster of millions of stars, such as may fall under the IIId form of nebulæ considered in a foregoing paragraph. Here also the heavens will not only be richly scattered over with brilliant constellations, but a shining zone or milky way will be perceived to surround the whole sphere of the heavens, owing to the combined light of those stars which are too small, that is, too remote to be seen. Our observer's sight will be so confined that he will imagine this single collection of stars, of which he does not even perceive the thousandth part, to be the whole contents of the heavens. Allowing him now the use of a common telescope, he begins to suspect that all the milkiness of the bright path which surrounds the sphere may be owing to stars. He perceives a few clusters of them in various parts of the heavens, and finds also that there are a kind of nebulous patches; but still his views are not extended so far as to reach to the end of the stratum in which he is situated, so that he looks upon these patches as belonging to that system which to him seems to comprehend every celestial object. He now increases his power of vision, and, applying himself to a close observation, finds that the milky way is indeed no other than a collection of very small stars. He perceives that those objects which had been called nebulæ are evidently nothing but clusters of stars. He finds their number increase upon him, and when he resolves one nebula into stars he discovers ten new ones which he cannot resolve. He then forms the idea of immense strata of fixed stars, of clusters of stars and of nebulæ; till, going on with such interesting observations, he now perceives that all these appearances must naturally arise from the confined situation in which we are placed. *Confined* it may justly be called, though in no less a space than what before appeared to be the whole region of the fixed stars; but which now has assumed the shape of a crookedly branching nebula; not, indeed, one of the least, but perhaps very far from being the most considerable of those numberless clusters that enter into the construction of the heavens. * * *

Other Nebulæ

Among the great number of nebulæ which I have already seen, amounting to more than 900, there are many which in all probability are equally extensive with that which we inhabit; and yet they are all separated from each other by very considerable intervals. Some indeed there are that seem to be double and treble; and though with most of these it may be that they are at a very great distance from each other, yet we allow that some such conjunctions really are to be found; nor is this what we mean to exclude. But then these compound or double nebulæ, which are those of the third and fourth forms, still make a detached link in the great chain. It is also to be supposed that there may still be some thinly scattered solitary stars between the large interstices of nebulæ, which, being situated so as to be nearly equally attracted by the several clusters when they were forming, remain unassociated. And though we cannot expect to see these stars, on account of their vast distance, yet we may well presume that their number cannot be very considerable in comparison to those that are already drawn into systems; which conjecture is also abundantly confirmed in situations where the nebulæ are near enough to have their stars visible; for they are all insulated, and generally to be seen upon a very clear and pure ground, without any star near them that might be supposed to belong to them. And, though I have often seen them in beds of stars, yet from the size of these latter we may be certain that they were much nearer to us than those nebulæ, and belonged undoubtedly to our own system.

Frederick William Herschel was born in Hanover, Germany, November 15, 1738, and died in Slough, England, August 25, 1822. He began his career as a musician in the band of the Hanoverian guard, at the age of 14. At 19, having already served for a time in the Seven Years' War, his family sent him to England, where he lived by teaching music. When he was 28 his appointment as organist at the chapel at Bath brought him to the climax of his musical fortunes and gave him leisure to study. He turned to astronomy and, since he could not buy a suitable telescope, he made himself one. In 1772 Herschel brought his sister Caroline to England, and she soon became his assistant and as enthusiastic an astronomer as he. Herschel's first paper on astronomy was presented to the Royal Society in 1780. The next year the Society presented him with the Copley Medal. Variable stars, sun-spots, and the rotation of the planets were his first subjects of study. He discovered the planet Uranus in 1781. The next year he began a catalog of the stars, and during that study identified many pairs of double stars. Herschel's theory of isolated star systems, though not highly regarded in his day, has recently become a very fruitful hypothesis for present-day astronomers.